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TRACHOMA

IN

AUSTRALASIA

BY

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T R A C H O M A

in

A U S T R A L A S I A.

That a disease so pandemic as trachoma should occur in Australasia is, of course, only to be expected. That it is as prevalent, or as generally distributed, as is commonly supposed, is an opinion, the correctness of which I have, from an experience of twenty-five years in ophthalmic practice in Sydney, seriously questioned, and which I have set about trying to determine. With this end in view I have been making extensive enquiries, and have collected all the information I could as to the incidence, and distribution, and character of trachoma in Australasia generally.

At the outset the task of obtaining anything like accurate figures as to the prevalence of trachoma seemed to be one of considerable difficulty.

In the first place, the question as to what constitutes trachoma is answered differently in the minds of different men, and indeed it is not always easy for the most experienced to say whether a patient has trachoma or not.

There is no room for any difference of opinion in well marked cases with papillary and follicular sago grain, or hobnail granulations, thickening of lids, ptosis, pannus, and other corneal compli= cations, trichiasis, entropion, etc. The milder or earlier cases, with some slight injection, some roughening of the conjunctiva of the lids and fornices from follicular enlargement, with little or no thickening, no corneal or other accompani= ments, some would call trachoma, while others would consider either follicular or simple conjunc= tivitis. Even with the distinctions, as laid down in the text books, as between follicular and true granular ophthalmia, it is often impossible to diagnose with certainty trachoma from follicular conjunctivitis.

Another difficulty in the way of obtaining statistics lies in the fact that in the hospitals all but the more severe or complicated cases of trachoma are treated as out=patients, and of these, very imperfect records have been kept in the past, though quite recently the out=patients' diseases have been more fully tabulated. In the out=patient departments the comparative proportion of trachoma to other eye diseases gives the false impression of being large, because the former keep on attending for a very much longer time than do most other eye cases.

Again, in the far inland, and scattered districts where trachoma occurs, a large proportion of the cases do not come under hospital or professional treatment, and many get no treatment at all, and hence no kind of record of these is possible.

For the rest, the country practitioner generally treats them. It is only in exceptional or compli= cated cases that they are sent to specialists or hospitals in the large towns, partly because the local doctor is quite competent to treat ordinary cases, and partly, because of the distance and

expense of the journey to and from these towns, and of remaining there in idleness for the long period required to effect appreciable improvement. It is true that necessitous cases can always get a free railway pass to the chief towns, but when there, as they are either not at all, or only for a short time kept as in=patients, they cannot afford to stay away from home for the length of time necessary for effective treatment.

It seemed to me that the only way to get a fair idea of the incidence of the disease was to communicate with the doctors, hospitals, and public health departments all over Australasia. I therefore communicated with the medical men in practically every town in Australasia, and asked for reports from hospitals, public health depart=ments, and the departments of Education, whose medical Inspectors examine the school children (inter alia) for eye affections.

I have had a very generous response to my enquiries, and from the information thus collected have been able to come to a fair general conclusion as to the incidence and distribution and character of trachoma in Australasia.

Taking Australia as a whole, I have for my purpose divided it into three areas, firstly, the coastal, secondly, the para=coastal, mountains, and plateaux, and thirdly, the inland districts. I have also taken separately the artificial divisions of Australia into the various States.

Endeavour has been made to note the climatic conditions, and, broadly, the physical contour of the country, the nature of the soil, and vegetation, the social condition of the people, and the age incidence of the disease, also the special character=istics of trachoma (if any) as it occurs in Austral=asia.

A U S T R A L A S I A.

Australasia is generally understood as com= prising Australia (including Tasmania), New Zealand, Fiji, New Guinea, and some of the other neighbouring groups of Islands.

Australia proper (including Tasmania) has an area of about three million square miles (one fourth less than the area of Europe). It extends from latitude 10 39 S. to 43 39 south, and had a population on 30th June last of 4,421,795. The climate varies from tropical, through sub=tropical and temperate, to cold. On the higher peaks of the Australian Alps, of the mountains in Tasmania, and New Zealand there is perpetual snow.

Along the whole of the eastern coast of Australia there is a strip of country of an average width of about 40 miles, which is undulating, and hilly, extremely fertile, well timbered, except where cleared for cultivation, watered by short rivers, running from the mountains to the sea, and with a climate tropical in the north, temperate and salubrious from this to the south, but compared with the more inland parts, characterised by humidity, and blessed with a good average rainfall (See Map).

Except in the larger towns, the people are

mostly engaged in farming and pastoral pursuits, with timber cutting, mining, etc. in certain areas.

The mountain range, running roughly parallel with the coast, beginning about 40 miles from the sea, extends inland for another 50 or 60 miles, and then falls away to the inland plains. It varies in elevation along its crest, or central plateaux, from 2000 or 3000 feet to 7400. The temperature is hot in summer, cold, and in the southern two thirds cold (with snow and ice), in winter. The rainfall is moderate. The mountains are densely timbered (the trees, as throughout Australia, being for the most part gum trees (Eucalyptus)). They are comparatively sparsely populated. The climate is particularly salubrious.

The inland plains extend into the interior of the Continent, settlement thinning out towards the west, till it reaches vanishing point. These plains are mostly dry, and waterless, and very flat, For thousands of square miles there is not a hillock more than a few feet in height. There is little or no timber, except in small scattered patches and along the banks of the few rivers. The rainfall is small, especially in droughty years. The supply of water for domestic purposes is small, being mostly rain water caught on the (generally galvanised iron) roofs, and stored in iron tanks, or surface water impounded in dams, underground wells, and springs; artesian bores also provide a supply of water in places away from the rivers. The soil is black, or red, or sandy loam, which produces a marvellous growth of grass under the influence of a very little rain. After a drought the whole country is absolutely as destitute of grass or herbage, as brown and dusty as a well worn road. Let two or three inches of rain fall, and in a fortnight the whole is verdant with thick, long grass, which in four weeks more is as high

as a man's head.

Practically the whole of this areais used for sheep and cattle farming, and the growing of wheat. There is a little mining, and practically the whole population live mostly in the open air, even sleeping outside on verandahs, in the summer, because of the intense heat. The temperature in the shade rises to 120 or more in the summer, while in the winter it is fairly cold. The air is characterised by extreme dryness. Dust storms are frequent in many parts in summer. They appear suddenly, like a dense, dark cloud, sweeping along and enveloping a town with the darkness of night, and filling the dwellings with sand and dust. They are generally followed by a little rain.

The physical conditions along the greater part of the south of Australia are similar to those on the east. A strip of fertile coastal land, mountain range, and descent to the plains beyond.

In Western Australia, the mountains are replaced by lower hills. The district near the sea is comparatively fertile, and well timbered with a humid atmosphere, while towards the interior the country is more open, flatter, and the air hot and dry.

Northern Australia is tropical, hot and steamy, with luxuriant vegetation, numerous small rivers and swamps along the coast, but dry and hot inland. The population is very sparse, and consists mostly of aborigines, but even they are not numerous, existing only in small, mostly nomadic, tribes.

Broadly speaking, there is no trachoma indigenous to the coastal or mountain districts, but in the hot, dry inland parts of New South Wales, Queensland, and South Australia, it is very common, and, to a less extent in the hotter parts of West Australia. In Tasmania and New Zealand there is practically no trachoma.

N E W S O U T H W A L E S.

Taking the States in order of importance and population, New South Wales stands first, with an area of 310,700 square miles, and a population of 1,643,246.

The chief town, Sydney, contains over 600,000 people.

In this State, all along the fertile coastal districts, with the exception of the city of Sydney, and in the mountains trachoma is so rare as to be practically non-existent. In Sydney we have a seaport town with a population resident and migratory, drawn from other parts of Australia, and of the world generally.

Most, in fact all of the trachoma we have here is imported from other parts, most of it having come from the distant interior to the city hospitals, for treatment, or to get the benefit of the more salubrious climate of the coast. Even with these additions to the genuine Sydney population, the proportion of sufferers from trachoma is small. In moving about the city, one never sees trachoma as it is seen in the people in the streets of many other countries. The cases one sees in

private practice are few in number, and mild in character, as a rule, though occasionally a severe private case comes to one from the interior.

Dr. Odillo Maher, who has kindly gone through his notes for many years past, finds that the proportion of trachoma to all other eye diseases (excluding refractive cases) is 17.5 per cent.

Dr. Guy Warren finds that his cases of trachoma are 12.5 per cent. of all other cases, excluding refraction.

My own figures, extending over a period of 25 years are 6.7 per cent of trachoma out of all my eye cases. It is difficult to divide off ones refractive cases from others, as so many of the former have other complaints as well, including trachoma, and in so many affections it is necessary to estimate the refraction. As pure errors of refraction comprise about half my cases, the proportion of trachoma to others, excluding refractions, is about 13.4 per cent. I find that the vast majority of these come straight to me from the inland districts of this State, or from Queensland, and a few from Western Australia.

It was only last year that the Royal Prince Alfred Hospital began recording the diseases from which out-patients suffered, and their figures for 1909, and for the first ten months of 1910 are as follows:—

	1909		1910 Jan. 1st to Oct. 31st.		
	Out Patients	In Patients	Out Patients	In Patients	Total
Trachoma	96	14	88	17	215
Other Eye Diseases.	1111	155	932	82	2280
Total.	1207	169	1020	99	2495

Which gives a percentage of 11.65 of trachoma cases to all other eye diseases.

At the Sydney Hospital as yet only the in=patients' diseases are recorded. Their figures for 1909 are:— Total cases of eye diseases, 780. Total trachoma cases, 143, or 18.34 per cent. The in=patients would include a large number of cases sent from country districts. From a table furnished me by the Medical Superintendent, I find that of these 143 cases, 80 gave as their last address one or other of the hot inland districts; 11 were from asylums, and, with the exception of a few sailors, and half a dozen from the coastal and mountain districts, the rest gave their address as Sydney. Probably, nearly all, if not all, of those who were residing elsewhere before admission to the Hospital contracted the disease in the hot, inland districts.

Our eye cases, hospital and private, are drawn from all parts of the State, and also from Queensland and West Australia.

In hospital, as with private cases, we find that nearly every patient with trachoma has con=tracted the disease after long residence in some

hot, dry inland district. This is borne out, not only by our records, but by the fact that we never see Sydney children with the disease.

Dr. Grace Boelke, Medical Inspector of children in the State Schools, writes me:— "In the examination of the eyes of over 1,000 children, I have only once seen trachoma, and that was in a child who had come from Queensland."

I have answers to my enquiries from 16 doctors in other towns on the coast, and between the sea and the mountains, and there is such a uniformity in their statements as to the incidence of trachoma, that it would be superfluous to quote them all. The following are samples of their replies:— "Practically no trachoma here." "Have seen no cases." "Practically non-existent." "Very free from trachoma in this district." "Trachoma originating here very rare." "6 cases in 6 years." "Four cases in 2½ years," and so on. Of the very few cases seen some are said to have been imported, and while there is silence on this point in other instances, inasmuch as our population is a moving one, as compared with that of older countries, it is probable that most, if not all, of the cases about which this silence exists, are also imported cases.

The climate in the coastal districts is comparatively humid. (See Table)

Thirty-one doctors, practising in the highlands, sent replies to my enquiries, and they also indicate that in many places the disease is non-existent, whilst in others, it is very rare. The following are types of their replies:— "Practically unknown." "True trachoma unknown." "Have never seen a case of true trachoma in this district." "Have never seen any." "Very few cases of eye disease, and have not seen a case of bad trachoma in 16 years." "One case in three years." "No cases here." "Very few cases here." "Less than

one per cent of all eye diseases." "Two cases in 3½ years, and both of them imported." "Two cases in 16 years, and both of a mild type," and so on.

As the country falls and spreads out into the western plains there is a marked increase in the number of cases, and the hotter and drier the climate the greater the number. The proportion of trachoma cases to all other eye diseases is given as ranging from ten per cent to ninety-five per cent.

Dr. Day of Nyngan, 570 feet above sea level, flat, open country, with a summer temperature running up to 110 to 115 degrees in the shade, gives the proportion as eighty per cent of all eye cases.

In the Public Schools, of 12 girls examined at random, 5 had the disease; of 17 boys, 12 had it.

Dr. G. A. Buchanan, now of Goulburn (in the hill country, 2,000 feet above the sea) but formerly of Nyngan, says:— "One could not get a better object lesson of the importance of climate in relation to trachoma than to practice for a while in Nyngan and Goulburn, respectively, and one of the things I most remark in my practice here is the comparative absence of trachoma. In Nyngan, in summer especially, I had always several cases under treatment at the one time, when, as here, with a bigger list of patients, I have only seen one (moderately severe) case in over two years."

Dr. Fitzpatrick of Wilcannia, "very low" elevation, with a summer temperature running up to 120 degrees in the shade, says,:— "Trachoma is exceedingly prevalent. Very few cases come for treatment. My cases comprise 95 per cent of all my eye cases."

At Cobar, lowlying, flat country, lightly timbered, dry and dusty, with summer temperature of 110 degrees or more, Dr. Daish gives trachoma as furnishing 50 per cent of all eye diseases.

At Bourke, Wyalong, and Narandera, similar

lowlying country, hot, dry climate, the proportion of trachoma to all other eye cases is given as 75 per cent, 50 per cent, and 30 per cent, respectively.

Wellington, 996 feet above sea, summer temperature 90 degrees, hilly, timbered country, in the eastern part of the western area, has 25 per cent of trachoma to all other diseases. Dr. Graham writes:— "The drier and hotter the climate, the more intractable the treatment. (Sic). Cases from this district get better more quickly when they go to Sydney, or a moister climate, and often rapidly relapse when they return here."

At Cooma, Yass, Young, Moree, and Warialda the proportion averages as 10 per cent of all eye cases. These places have a lower summer temperature, and vary in elevation from 680 to 1,500 feet above sea. They are on the slopes towards the plain country.

Dr. Sutherland of Hay, very hot, dry plain country, writes me:— "I would be very pleased to give you any information I could about the prevalence, etc. of trachoma here, but unfortunately I cannot be certain whether any case of granular conjunctivitis, which I have seen, is genuine trachoma or not. In this district there are many cases of conjunctivitis of many years duration. They practically only occur among the lower classes. As we have long spells of dry weather, there is frequently dust, especially fine sand, blowing about, and often proving itself the start of a mild conjunctivitis. These are easily cured, but if neglected, and often induced again by fresh exposure to dust, are apt to lead eventually to a kind of chronic conjunctivitis. There was a good deal of severe acute conjunctivitis last summer. The pus showed abundance of Koch Weeks bacillus, and flies undoubtedly helped to spread the infection. There

are also several cases of pterygium here."

"The temperature in the summer gets up to near 120 degrees F. in the shade, at the hottest part of the day, and in winter sinks to 32 degrees F. on many winter nights. I am not certain of the average temperatures."

"As I said before I am not certain about the exact diagnosis of trachoma, and so my information could scarcely be relied on."

TABLE OF AVERAGE MEAN TEMPERATURE AND HUMIDITY
In The
RECORDED DISTRICTS OF NEW SOUTH WALES.

Place.	District	Percentage of trachoma to all other eye diseases	Average Mean Temperature		Average Mean Humidity.	
			Summer	Winter	Summer	Winter
Wilcannia	Inland Western	95%	79.6	52.8	45.3%	78.1%
Bourke	Inland W.	75%	83.9	54.1	50.8%	76.6%
Walgett	InlandN.W.	10%	82.8	53.0	54.4%	78.2%
Wentworth	Inland S.W.	50%	77.1	51.6	51.0%	83.3%
Hay	"	30%	75.5	50.6	53.7%	84.3%
Deniliquin	Inland S.W.	30%	74.1	48.5	53.9%	87.0%
Albury	Inland S.W.	Very few cases.	74.4	47.2	61.4%	87.1%
Forbes	Inland W. Slopes.	10%	77.0	48.7	56.6%	72.8%
Dubbo	Inland W.	50%	77.4	49.2	53.8%	84.2%
Grafton	Coast	Practically none	77.1	57.6	...	...
Newcastle	Coast	Rare	72.5	55.4	70.6%	76.7%
Sydney	Coast	†14.2%	70.9	53.8	70.3%	76.6%
Jervis Bay	Coast	Practically none	69.1	53.8	73.6%	74.8%
Armidale	Northern Highlands	Practically none	67.8	44.1	70.6%	81.9%
Broken Hill	Inland W.	80%	78.5	50.9	...	...
Tamworth	Northern Highland	Practically none	76.2	49.0	...	...
Wollongong	Coast	None	70.1	54.8	75.7%	73.9%
Young	Southern	10%	74.0	48.4	...	...
Bega	Coast	None	69.6	48.9	...	...
Bombala	Southern Highland	None	62.4	42.8	...	...
Hillston	Central S.W.	80%	77.1	49.1	...	...
Kempsey	Coast	None	75.5	56.0	...	...
Goulburn	Southern Highland	1%	67.9	44.0	64.9%	84.5%

†Mostly imported from other parts.

Q U E E N S L A N D.

This State has an area of 668,000 miles, and a population of 589,586.

The northern two=thirds extends from the Tropic of Capricorn to about 10 degrees from the Equator.

A range of mountains runs paralell with the eastern coast, at an average distance of about 50 miles from the sea.

The summer heat is intense, the maximum being 120 degrees (while the winter minimum is 34 degrees), but; except along the coast, the heat is dry.

The State has a high repute for health, and is remarkably free from pulmonary and contagious dis=eases.

About Christmas time the rainy season commences, and lasts till about the end of February, or begin=ning of March.

The people, outside the towns, are practically entirely engaged in pastoral, agricultural, and min=ing industries, and, with the exception of the miners, spend practically all day in the open air, and, on account of the heat, sleep a great deal in verandahs, or houses with wide open doors and windows.

Trachoma is almost unknown in the highlands, and in the country between the mountains and the sea, which is mostly fertile, hilly, and undulating country, for the most part timbered, except where cleared for cultivation.

In the coastal towns there is some trachoma, but

most of the cases are sent there from the hot, dry western and north western inland districts.

Dr. Lockhart Gibson, who has been practising as an ophthalmic specialist in Brisbane (the capital of the State) for a quarter of a century, writes me:—

"The disease" (trachoma) "occurs so rarely in Brisbane that it may be said to be non-existent, unless introduced from without. I am sure that in my private practice, during all my time here, I could count on the fingers of one hand those cases of trachoma which appear to have originated in Brisbane, and when it was not possible to obtain a history of contagion. ....."

"The disease appears to be very rare in the coastal districts, and when it occurs is probably introduced from an inland source."

With regard to his hospital practice, he writes that he could fill the wards several times over, if he admitted any but the severest cases of trachoma, but that these cases come almost entirely from the western and north western districts.

All the practitioners in the coastal and mountain districts write in the same strain.

Dr. Brown of Ipswich says:—

"Have not seen a case in three years."

Dr. Cameron of Ipswich says:—

"Trachoma practically never seen."

Dr. Webb of Adavale:—

"Have seen no cases."

Dr. Nesbit of Townsville:—

"Not more than one per cent of all eye cases, and generally imported."

Dr. Young, Clifton, Darling Downs:—

"Very few cases come under my notice."

Dr. Jenkins, Mount Garnet, North Queensland, Inland:—

"Practically unknown."

Dr. Tarleton, Nanango, mountainous, timbered country, hot and dry,—

"Trachoma very rare. All cases seen imported from western Queensland."

Dr. MacDonnell, Herberton, North Queensland, 3000 feet above the sea; hilly, timbered country:—

"Trachoma practically unknown; only imported cases."

Dr. Freshney, Toowoomba, (2000 ft.) open, hilly country:—

"We have but few; most come from the west."

Dr. Clarkson, Ayr, North Queensland, hot,dry; sea level; flat, timbered country:—

"Have seen no trachoma."

Dr. Summers, Goombungee, (2000 ft), hilly, timbered, hot, dry:—

"Trachoma practically non-existent."

Dr. Garde, Maryborough; important coastal town; flat, open, humid:—

"Practically none in seven years." "In charge of hospital, only two cases (chronic) in two half-caste children from the half-castes' settlement."

At Mungundi in south west Queensland, on the borders of New South Wales, 680 feet high, absolutely flat country, the doctor writes that he has not seen a case in the last five years.

And so on, with practically all the replies from the coastal and hilly districts.

When we come to the western and north western districts, a very different state of things exists. In parts of this district the disease is so common, especially in children, as to be considered by the parents, as almost a natural condition— inevitable.

Dr. J. M. Roe, who had charge of the hospitals at Thargomindah and Muttaburra, writes that in both places over 50 per cent of the children had the

disease.

I have before me a report on ophthalmia in the western districts of Queensland, by Dr. W. F. Taylor (who was commissioned by the Government to visit those districts, and report), which was laid on the table of the Legislative Assembly, and ordered to be printed.

He examined the State School children in Charleville, Tambo, Blackall, Isisford, Longreach, Barcaldine, Aramac, Muttaburra, Winton, Hughenden, and Richmond. This work occupied from the 4th October to 25th November (early summer). Acute cases become prevalent later on in the summer, especially after rain, when, as the grass grows, the flies multiply, and become such a nuisance that it becomes necessary to wear close fitting veils of mosquito netting to have any measure of relief from their attacks. Still it is remarkable that Dr. Taylor did not see a single case of acute ophthalmia. "The disease runs very much in families; cases in which all the children are infected, perhaps five or six, or even more, together with the mother, are not uncommon. The father more often escapes, especially if his work takes him a good deal out of doors."

Dr. Taylor was furnished with a complete outfit of sterilised cover glasses, and cultivation tubes, but was unable to make use of them owing to the absence of any cases with a discharge, but he believes that the majority of cases examined were the result of primary attacks of acute contagious ophthalmia (acute, or epidemic catarrhal conjunctivitis). Dr. Taylor remarks that, differing from the ordinary catarrhal ophthalmia, in the sandy blight of Western Queensland, the cornea is frequently affected; the affection taking the form of a superficial vascular keratitis, with, not unfrequently, ulceration of the cornea. He distinguishes this from the pannus occurring in trachoma by its

being thinner, by its occurring at a comparatively early stage of the disease, and by its tendency to spread over the cornea. This indicates the difficulty I referred to at p.1 & 2. Many observers would include these cases under trachoma; Dr. Taylor draws a distinction. He says further, "Papillary hypertrophy (papillary granulation) is a very common result of the disease in Queensland, and varies from a mere roughness of the palpebral conjunctiva to large and exuberant granulations. The conjunctiva does not completely recover from even a comparatively mild attack of 'blight' for so long as the patient remains in the West; papillary granulations, however small, will persist, and render the eye liable to a fresh attack of conjunctivitis, when the 'fly season' arrives."

"Every one examined by me during my visit to the West, that had had an attack of blight at some time or another, showed evidence of some enlargement of the palpebral papillae."

"In these particulars, then, acute contagious ophthalmia in Western Queensland differs from the disease in most other parts of the world. This may probably arise from the fact that in the Queensland disease there is a mixed infection; some other specific micro-organism, as well as the Koch Weeks bacillus, taking part in its production."

He goes on, "Chronic granular conjunctivitis (trachoma) was present in a number of children, and adults examined; 173 cases in all, and about 72 had corneal complications. Papillary granulations were also fully developed in most of these, excepting the cases in an advanced state of cicatrization, and some follicular hypertrophy also existed in a few instances."

"Whole families are often the victims of this disease in varying degrees of severity, from the quiescent, unnoticeable condition, to the dreaded

sequelae of the graver form, viz. contracted eyelids, with entropion, trichiasis, and pannus. More or less ulceration of the cornea is frequently present, with, in many cases, much intolerance of light. I was told at one place that some young people had not been outside the house for seven, eight, or even ten years."

"The climate of the western districts, during my visit, was dry, with hot days and comparatively cool nights. The air was clear and stimulating. The school children were bright, intelligent, well behaved, and well mannered, with good physique, and considerable courage and fortitude, if one may judge from the almost stoical manners, with which, with very few exceptions, they sat down, and submitted to have their eyes examined, and lids everted."

Dr. Taylor appends the following tables.

TABLE SHOWING THE RESULTS OF THE EXAMINATION OF THE EYES OF CHILDREN ATTENDING THE STATE AND CONVENT SCHOOLS AT THE DIFFERENT PLACES NAMED, AND THE EYES OF OTHER PERSONS RESIDING AT OR NEAR THOSE PLACES, AND THE DATE OF EACH EXAMINATION.

Date	Place.	No. of Children on Roll, State School	No. of Roll Convent School	No. Examined State School	No. examined Convent School	No. of Other Persons Examined	Total number Examined
1907.							
7 & 8 October	Charleville	271	...	227	...	4	231
11 & 12 October	Tambo	84	...	64	...	6	70
15 & 16 Oct.	Blackall	211	...	157	...	16	173
21 & 22 Oct.	Isisford	85	...	85	...	25	110
25—28 Oct.	Longreach	290	152	248	125	30	403
31 Oct. & 1 & 2 Nov.	Barcaldine	230	90	216	74	25	315
5 Nov.	Aramac	97	...	96	...	13	109
8 Nov.	Muttaburra	90	...	84	...	4	88
12 & 13 Nov.	Winton	165	100	157	96	10	263
18 & 19 Nov.	Hughenden	126	87	114	82	31	227
21 Nov.	Richmond	136	...	120	...	23	143
							1,932

RESULTS.

Number of cases of Hypertrophy of Conjunctival Papillae.

Place.	Without Corneal Opacities				With Corneal Opacities.			
	State School Children	Convent School Children	Other persons	Total	State School Children	Convent School Children	Other persons	Total
Charleville	14	...	...	14	13	...	4	17
Tambo	49	...	6	55	6	...	...	6
Blackall	198	...	12	120	22	...	4	26
Isisford	59	...	13	72	14	...	10	26
Longreach	164	82	16	262	43	24	10	77
Barcaldine	155	25	5	185	26	14	9	49
Aramac	72	...	6	78	4	...	...	4
Muttaburra	58	...	...	58	14	...	4	18
Winton	100	63	3	166	21	9	7	37
Hughenden	81	56	20	157	18	7	7	32
Richmond	80	...	7	87	16	...	7	23
				1,254				313

RESULTS. (Continued).

Number of Cases of TRACHOMA.

Place	Without Corneal Opacities				With Corneal Opacities				Percentage of Cases of Trachoma to Number Examined
	State School Children	Convent School Children	Other Persons	Total	State School Children	Convent School Children	Other Persons	Total	
Charleville	...	...	...	...	...	...	..	...	...
Tambo	...	...	...	...	3	...	..	3	4.28
Blackall	13	...	...	13	12	...	..	12	14.45
Isisford	7	...	1	8	4	...	..	4	10.9
Longreach	22	6	4	32	3	...	..	3	8.68
Barcaldine	10	11	...	21	5	3	2	10	6.66
Aramac	2	...	...	2	6	...	4	10	11.0
Muttaburra	5	...	...	5	3	...	...	3	9.0
Winton	4	5	...	9	7	4	...	11	7.6
Hughenden	2	3	...	5	6	2	...	8	6.4
Richmond	4	...	2	6	4	...	4	8	9.78
				101				72	

R E S U L T S. (Continued)

Number of persons suffering From Imperfect Vision Resulting from Eye Disease.					Total Number of Persons with affected Eyes or Eye-lids or Both	Per cent of Persons with affected Eyes or Eye-lids or Both	Total Number of Persons with Healthy Eyes and Eye-lids	Percentage of persons with Healthy Eyes and Eye-Lids.
Place	State School Children	Convent School Children	Adults	Total				
Charleville	13	...	4	17	31	...	...	...
Tambo	9	...	..	9	64	91.43	6	8.57
Blackall	34	...	4	38	171	98.85	2	1.15
Isisford	18	...	10	28	108	98.2	2	1.8
Longreach	46	24	10	80	374	92.8	29	7.2
Barcaldine	31	17	11	59	265	84.12	50	15.87
Aramac	11	...	3	14	94	86.24	15	13.76
Muttaburra	17	...	4	21	84	95.45	4	4.545
Winton	28	13	7	48	223	84.0	40	15.2
Hughenden	24	9	7	40	202	89.0	25	11.0
Richmond	20	...	11	31	124	86.7	19	13.29
	251	63	71	385	1,740	...	192	...

The country in Western Queensland is mostly flat, and sparsely timbered. The people are engaged in pastoral, agricultural, and mining pursuits

From the Laboratory of Micro=Biology and Pathology in Brisbane, I have received the follow= ing report in answer to my enquiry.

"The bacteriological examinations undertaken by this Laboratory during the latter part of 1907 & beginning of 1908 of sand, dust, & flies forward= ed by Dr. Taylor from the Western districts of Queensland was not of a conclusive nature. Altogether 28 individual specimens were subjected to exhaustive examination, which, as you can well imagine, entailed a tremendous amount of work.

The report states that the majority of the micro=organisms present in the specimens of sand and dust were bacilli & cocci of a resistant character, and that special efforts were made to ascertain if any of these organisms were B. Coli communis, but without positive results.

The report also mentions that broth cultures of the various organisms isolated were injected into the eyes of Guinea pigs, but no definite reaction or any symptoms of ophthalmia eventuated."

The annual rainfall for Brisbane and suburbs (a fair sample of coastal districts) is 45 inches: mean temperature, summer, 76 degrees, winter 61 de= grees: humidity, summer, 70.5, winter 70.2. (Satura= tion = 100). At Tambo and Blackall, taken together (a fair sample of western districts) the annual rainfall is 45.5 inches: mean temperature, summer 81.3 degrees, winter 62.5 degrees: humidity, summer 49.2, winter 57.

P A P U A.

The Island of Papua, or New Guinea, lies adjacent to the most northern point of Australia proper.

Dr. Fleming Jones, in charge of the hospital at Samarai— the chief town— writes me:—

"It is nearly six years since I came to Samarai, and I see professionally nearly 3000 natives per annum, some eight hundred being patients in the hospitals, and the remainder, labor recruits who come for medical examination. I have never seen a case of trachoma amongst these natives, or heard of any cases in other parts of the Territory.

The climate of this, the eastern part of Papua, is warm and humid. Samarai mean maximum temperature is 84.3, mean minimum, 75.9. Rainfall 146 inches per annum, humidity 78.

We get only occasional cases of catarrhal conjunctivitis here.

At Port Moresby the meteorological conditions are somewhat different. The mean maximum temperature is 86.1, mean minimum, 75.1; rainfall 38 inches; humidity 72. There is quite a lot of dry, dirty weather there, and Dr. Craigin, who was at Port Moresby when I first came here, told me that he had noticed epidemic waves of conjunctivitis, but only of the catarrhal variety. I have not heard of any of these epidemics of late years, and the Annual Reports make no mention of anything of the kind."

V I C T O R I A.

Victoria has an area of 87,884 square miles, and a population of 1,308,705.

In Victoria trachoma is rare, and here, as in New South Wales, and Queensland, it is practically absent on the coast, and highlands, and occurs to a very limited extent in the northern and north eastern districts.

From the replies I have received, I find that in the whole of Gippsland, a district on the east coast, rising to high, heavily timbered country further inland, there is no trachoma.

In the country along the south coast also, and extending inland to the hills, there is "very little trachoma." Northward of this, in the Mallee district it is somewhat more frequent, but still rare. In the northern part of the State, from Gippsland in the east to the western border of the State, and bounded on the north by the river Murray, it is less uncommon, but even in these districts it does not attain to any real importance.

Drs. Barrett and Orr, of Melbourne, published a paper in the "Intercolonial Medical Journal of Australasia for September, 1909" on the distribu=

tion of Trachoma in that State. The method adopted by them was the examination of every case of tra= choma that presented itself at their clinic at the Victorian Eye and Ear Hospital, and the determina= tion in each case of the place of residence at the time of the original infection. The collection of their one hundred cases took a considerable time. They remark that "It is obvious that the method is not strictly accurate, but it is the best available. It is to be presumed that only a bad case of tra= choma took the trouble to come to Melbourne to be treated at the Eye and Ear Hospital. Furthermore, it is clear that if there happened to be in the vicinity of any particular district someone with a reputation for being skilled in the treatment of eye diseases, a number of cases would be intercepted. The distances, and consequently the expense of travelling from different parts of the State, also differ, so that the simple determination of the place of origin of all the cases is not a certain means of obtaining the necessary information. At the same time, it is the only means available, and probably represents something very near the truth. It became necessary to divide the State into the dis= tricts usually employed by the Commonwealth Meteor= ologist, and to include in these the several politi= cal divisions, in order to form some idea of the population in respective districts. We have then placed the cases as nearly as may be in the several divisions."

District	Total Population	Total Trachoma cases	Percentage of Trachoma to Population.	Mean Summer Temperature and Humidity. Town.	Temperature.	Humidity
Gippsland		No cases		Sale	65.4	65
				Bairnsdale	64.4	..
North Central	88,419	2	.00226	Seymour	69.4	60
Central	688,920	26	.00377	Melbourne	66.4	65
				Laverton	63.9	72
Western	140,231	9	.00641	Ballarat	62.5	..
				Colac	64.4	..
				Hamilton	64.2	70
				Ararat	65.1	77
Wimmera	66,506	6	.00902	Stawell	67.4	59
				St. Arnaud	70,4	54
Mallee	20,835	5	.02399	Mildura	76.9	..
				Swan Hill	75.5	44
Northern	143,603	33	.0269	Echuca	72.8	53
				Bendigo	70.4	55
				Shepparton	70.3	57
North Eastern	64,774	19	.02933	Rutherglen	73.8	41
				Benalla	73.2	..
				Beechworth	72	43

This table indicates very well how the proportion of trachoma cases increases with the increased temperature and dryness.

"These districts and divisions often include places very diverse in both physical and social characteristics. Thus, the North=Central District includes Daylesford, a mountainous town with an elevation of 1600–1800 feet above the sea, and Seymour, a town on the Goulburn not much above sea level. And, again, the Central District differs from all the others in containing Mel= bourne, a city of some 550,000 inhabitants, who are on the whole better housed and less exposed to contagion than the inhabitants of some of the sparsely peopled plains of the North and North= West. Nevertheless, looked at broadly, heat, dryness, and dust are the fundamental underlying factors in the distribution of trachoma."

Of the practitioners who have replied to my enquiry as to the proportion of cases of trachoma to all other eye diseases in their respective districts, none gives the percentage as greater than 2 per cent, and these are in the Mallee, Northern, and North=Eastern Divisions. Most of them say that they see practically no trachoma, and in Gippsland that there is none at all.

Dr. Jane S. Greig, Government School Medical Officer, in the examination of 8000 school children, found only one case of trachoma. This was in the Central Division, chiefly.

S O U T H A U S T R A L I A.

Including the Northern Territory, the area is little short of 1000,000 square miles. The area of South Australia proper being 380,000 square miles, with a population of 417,493.

The climate of the Northern Territory is tropical, and influenced as to rainfall by the monsoons. The climate of South Australia proper is very varied; the temperature of Adelaide, in 34 degrees S. Latitude, varying from 34 degrees to 115, or even 120 degrees Fahr. In the central desert it reaches 135 degrees in the shade, and in the sun 175 degrees, which is probably not exceeded anywhere in the world. The rainfall is small, and the air generally dry. In Adelaide the annual rainfall is only 20 inches, and in the rest of South Australia it varies from 9 inches at Port Augusta, to 40 inches at Mount Lofty, 2300 ft. above sea level, situated a few miles from Adelaide.

A feature of the climate is the terrible, hot, dry northern winds, which scorch and devastate the country in the summer. They are accompanied by dense clouds of dust, and in the interior, flat country occur about once a week, and render the air as obscure as does a thick London fog. The hot winds are occasionally experienced further south, but are not nearly so severe, and are not

accompanied by so much dust.

The most fertile part of the State is the south eastern. It extends with varying degree of fertility inland to what is known as "Goyder's Line." (See map). Beyond this the character of the soil, and vegetation changes, and farming is there precarious, and the population scanty.

The chief pursuits of the people outside the cities is agricultural, and, to a limited extent, viticulture, and pastoral, with mining, chiefly gold and copper, in certain areas.

Goyder's Line was not drawn by guess work, nor was he aided by meteorological statistics, as, at that time, these were not available, but simply from observation of the character of the native herbage. South of this Line the rainfall is fairly regular, north of it, it is very small, and irregular, and uncertain. North of the Line the comparatively green and tender herbage is replaced by tufty, hardy, drought resisting types. The country is mainly flat and mineralised, with little or no timber. It is here that the hot winds are most present, and most constant. The soil is dry and friable, and the "country literally shifts in dust storms." (Dr. Bennett).

Trachoma occurs to a comparatively slight extent in the southern and coastal districts. For example:—

Name of Town.	Where Situated	Mean Summer Temperature.	Mean Winter Temperature.	Character of Climate	Proportion of cases of Trachoma to all other eye Diseases.
Yorketown	West Coast of St. Vincent's Gulf.			Humid	No Trachoma.
Moonta	E. Coast of Spencer's Gulf	90	75	Dry	3 per cent
Wallaroo	E. Coast of Spencer's Gulf.	90	65	Dry	6 per cent
Mount Pleasant	Near Adelaide	90	60	Dry Summer. Humid Winter	5 per cent
Tanunda	Near Adelaide	90	60	Dry Summer. Humid Winter	Under 10
Gawler	Near Adelaide				1 (imported) case.

Dr. Abbott, who practised for years on the West Coast of South Australia, never saw one case of trachoma..

I have before me also the "Report of the Medical Inspection of One Thousand Pupils attending the

Public Schools of South Australia during 1910," by Dr. R. S. Rogers. The schools inspected comprised four in the metropolitan area, fourteen in the districts south and south east of Adelaide, and nineteen in the districts north, and north east, and north west of the metropolis, extending as far north as Traquair, on "Goyder's Line," Eurelia, Willochra, Hawker, Leyh Creek, and other places to as far as two hundred miles north of "Goyder's Line," so that, as the Report says, "the State was fairly well represented." The examination of the eyes was very thorough, and numerous elaborate tables, and coloured charts, and diagrams are given of colours of eyes, acuteness of vision, colour blindness, condition of refraction, squint; and yet under the last paragraph "Diseases of the Eye," all the Report has to say is, "39 cases of blepharitis were observed, three of trichiasis, six of stye, two of simple conjunctivitis, one of traumatic cicatrix corneae, one of coloboma, one of iridectomy, three of asthenopia, one of double nystagmus, three of corneal ulcer, and three of interstitial keratitis." Apparently, not a single case of trachoma was observed, (though, possibly, the trichiasis may have been due to trachoma). This is all the more remarkable, inasmuch as several schools in towns in the far north, well beyond "Goyder's Line" were inspected. As we shall see presently this part of South Australia is said to be full of trachoma.

Though, as the above statements show, trachoma is rare in the southern parts of this State, it is very prevalent in the north. For instance:—

Dr. Birks of Traquair, 1700 ft. above the sea, hot and dry, says, 50 to 75 per cent of all his eye cases are trachoma.

Dr. Darosay of Laura, 800 ft. above the sea; mean summer temperature 88 degrees, mean winter temperature 60 degrees, says, all his eye cases

"excluding catarrhal conjunctivitis" are trachoma.

Dr. J. B. Kennedy of Oodnadatta, 688 miles north of Adelaide, gives me some very full information. He writes:—

"I may state that I can speak only for my district between Hergott and Oodnadatta, a distance of 250 miles. Hergott being 275 miles from the sea, and 155 feet above sea, Artesian Bore 342 feet; Oodnadatta 575 miles from the sea, and 397 feet above sea, Artesian Bore 1571 feet. I enclose tables showing rainfall and maximum and minimum temperatures for 1909 and 1910. I find trachoma more prevalent in Gypsum soil and where there is little vegetation. The glare being strong, and the dust fine. Population of Hergott about 150, Oodnadatta 120. I venture to state that at least 2/3 of the school children are affected with some form of eye trouble — trachoma, myopia or eye squint. Trachoma stands first on the list. The same applies to adults. The little fly is ever busy. Bung eyes and bung lips are very common. Children's eyes are shamefully neglected. A little splash of water in the morning and that is all they see for the day. Parents do not protect their children's eyes with veils and goggles. The atmosphere is largely composed of oxygen, flies and dust."

Dr. Kennedy sends me the following tables of Temperature and rainfall:—

TEMPERATURE. 1909.

Month	Mean Max.	Mean Min.	Max.	Date	Min.	Date.
January	94.5	68.1	117.0	2nd	56.5	4th
February	94.5	66.0	105.0	22nd	56.5	2nd
March	90.0	61.6	102.0	3rd	50.0	12th
April	74.6	51.6	100.0	4th	42.0	27th
May	71.2	46.5	88.5	12th	37.0	17th & 27th
June	64.3	45.8	78.0	18th	35.5	30th
July	62.5	39.3	71.5	5th	29.0	17th
August	67.6	44.5	86.5	18th	33.0	3rd
September	75.2	48.2	94.0	30th	40.5	22nd
October	79.0	58.1	102.0	27th	41.0	4th
November	88.2	60.5	105.0	7th	48.5	1st
December	93.8	61.9	110.0	20th	52.0	1st

RAIN RECORD — WILLIAM CREEK.

Month	Year.									
	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
January	Nil	126	24	Nil	47	9	34	Nil	16	5
February	311	15	Nil	157	Nil	52	Nil	81	Nil	2
March	130	3	73	Nil	1	246	Nil	482	11	475
April	32	Nil	145	17	24	3	Nil	23	11	5
May	Nil	Nil	68	72	3	66	30	16	54	124
June	13	17	Nil	25	297	129	304	4	87	166
July	Nil	Nil	Nil	221	149	41	24	62	Nil	41
August	32	Nil	56	38	Nil	52	11	13	59	42
September	5	5	57	220	33	80	14	77	Nil	72
October	5	5	58	245	41	28	11	15	23	—
November	38	55	155	6	18	9	190	18	42	—
December	18	182	71	26	Nil	41	10	49	Nil	—
Totals	584	408	707	1027	613	756	628	840	303	932

The figures in this table mean hundredths of inches, thus, 311 is 3.11 inches.

Dr. A. H. Bennett, who has had many years' experience, and has made a special study of trachoma in these districts, has also sent me some valuable particulars.

He points out that, though trachoma does occur inside "Goyder's Line," it is not often seen, while it is very common to the north of it. So much so that "it provides quite half of the work that falls to the daily routine of the South Australian ophthalmic surgeon." (This refers to true trachoma). Of the climate and physical condition of the country, he writes:—

"South Australia is a riverless country and excepting a narrow belt of land adjacent to Adelaide and the South Eastern portion of the Colony, is destitute of fresh water lakes or permanent fresh water creeks. There are creeks which run with fresh water during the winter — rainy — season, but these, when dependent on natural springs, either dry up in the summer months or convey water which is brackish, unfit, or fit only, for the watering of cattle. Each individual farmer in a newly populated district has to arrange receptacles for the storage of surface flood waters. The type usually constructed is the open earthen dam, and the greatest economy in the use of the conserved water has to be exercised, to tide the comparatively limited supply over the frequently rainless summer months. Hence it is not surprising that children, though well enough fed and sufficiently clothed, are allowed to neglect their ablutions.

"During the summer months high winds are frequent, and the soil is dry, so that it is lifted and driven in the form of gritty dust through the atmosphere. Averaging, say, once a week there is a dust storm, fierce, and dense as a London Christmas pea-soup fog. Conjunctival sacs are filled with gritty dust, irritating to the mucous membrane, and the irritation is aggravated

by fingers used to rub out the foreign particles. Hyperaemia of the conjunctiva ensues, and a consequent weakening of the membrane. Pathogenic germs find this suitably weakened membrane, invade the passively-resistant tissue, and set up a conjunctivitis each sui generis.

"Rivalling the dust grains in insinuation— and almost in number— the pestiferous flies regale themselves on the conjunctival discharge, and transfer the microbe infected exudate to other conjunctivae. In this way even children who are kept scrupulously clean become infected, and the dreaded "sandy-blight" proliferates."

As in the hot, dry districts of Queensland, and New South Wales, the form of contagious ophthalmia, known as Sandy-blight (it is not to be confounded with trachoma), is very prevalent in the hot, dry parts of South Australia. Dr. Bennett's clinical picture of the disease is so good that I quote it in full:—

"Preceded by two or three days of itching and redness of the conjunctiva, there appears a yellowish, creamy, purulent-looking, copious discharge. Externally, the lids appear swollen, the margins slighted everted, and if closed for any lengthy period, as in sleep, they become glued together by the drying discharge. Prolonged warm bathing is necessary to free the lid margins, and when freed, retained secretion spurts out. Photophobia and free lachrymation are present. The lids are difficult to evert owing to the chemosis. The whole of the conjunctival sac except the bulbar portion is covered with gross, puffy, velvety, follicular granulations, the bulbar portion looking pinkish, smooth, and polished, like an early gonorrhoeal conjunctivitis. Both eyes are generally affected. The discharge reaches its maximum in a week, and in uncomplicated and properly cared for

cases, subsides gradually and disappears in a fort= night, the conjunctiva becoming healthy in a month.

"But many of the cases do not complete this simple cycle. Either from neglect or idiosyncrasy, the conjunctiva remains irritable and inflamed, and the follicles though diminished in size still produce a glutinous exudate. The disease has a preference for young children and the adolescent, but adults quite frequently are infected, and suffer in greater measure from the lid swelling, than do the younger patients. The majority of the children affected are not seen by medical men— unless they are club patients— as there is generally someone in the district learned in the fact that white vitriol, diluted to the strength of two to four grains to the ounce of water, is an efficacious application. There are also numerous proprietary eye lotions sold in the Colony by stores and chemists, the basis of which is generally zinc in some soluble form."

As regards true trachoma, which does not differ clinically from trachoma elsewhere, Dr. Bennett, who has had experience both inside and outside of "Goyder's Line", says it is twenty times as frequent just outside (i.e. to the north) as it is immediate= ly inside it. Further north it is worse still.

W E S T E R N A U S T R A L I A.

Western Australia, the most recently and most sparsely settled of the Australian States has an area of over one million square miles, and a population of 279,360, nearly all of which is gathered in the coastal towns of Perth, and Fre= mantle, and the goldfields of Coolgardie, Kal= goorlie, and neighbouring districts, though a fair number of the people are engaged in pastoral and agricultural pursuits in the coastal districts of the south, and western quarter of the State.

The coastal districts are fertile, and heavily timbered, while the inland country is flat, open, and for the most part, dry and barren. Water is everywhere scarce, except near the coast.

The climate is hot and dry, but, on the whole, less so than in South Australia, and the much larger extent of coast line, with cool, moisture laden sea= breezes, gives a much larger area of comparatively cool climate.

Except in a few places, trachoma is not common, not nearly so common as in Central Queens= land, and the northern parts of South Australia. For instance:—

Dr. Harvey of Norseman, a gold field district,

900 feet above the sea, hilly, timbered country, very hot and dry in summer, cold in winter, has not seen a case of trachoma for some years.

Dr. Harvey of Kalgoorlie, a flat, hot, dry, dusty, gold mining district, writes that it is "quite rare."

Dr. Barber of the same place, writes, "This place is very dusty in summer, and you might expect a lot of trachoma, but this is not the case. There is a very small proportion of trachoma to other eye diseases, and all cases except those of direct infection (families) having suffered before elsewhere."

Dr. Berridge of Kalgoorlie writes, "it is quite rare."

Dr. Holland of Kanowna, a gold mining town 1200 feet above the sea, very flat, and poorly timbered, extremely dry summer and winter, writes, "Very few are so troubled as to continue treatment. It is significant that in these gold fields, with a population of 70,000, there is no ophthalmic specialist."

Dr. Lewis of Narrogui, 1150 feet above the sea, hilly and timbered, climate dry, writes, "I see comparatively few eye cases."

Dr. Paton of Broome, flat country at sea level, partly open plain, partly bush, dry in winter, humid in summer, says the proportion of trachoma to all other eye diseases is $1\frac{1}{2}$ to 2 per cent.

Dr. Triado of Lawlers, flat, timbered country at sea level, climate hot and dry, has only seen two cases in four years' practice there.

Dr. Tofft of Campbelltown, 700 feet above the sea, hilly, open country, hot and dry, has only seen two or three cases in 20 years.

Dr. Weihen, Ophthalmic Specialist, recently examined 1,700 school children in and around Perth for the Government of Western Australia. He

found 24 cases of trachoma, recent or old, as shown by scarring of the lids. He adds that "in investigating another separate outbreak of muco= purulent (Koch Weekes) conjunctivitis in one school, out of 87 children examined, I came across 5 trachoma cases,—classic, from a clinical stand= point— all members of one family."

The President of the Department of State Medicine at Perth, Western Australia, has forward= ed me a report on the eyes of 1268 children examin= ed more recently. Of these, 13 were found to be suffering from trachoma.

Dr. Cleland, at that time in the service of the Central Board of Health in Western Australia, writes me that in October (spring) of 1908 he was despatched to Mullewa, a small railway town, with about a score of houses, to investigate an out= break of trachoma amongst the school children. The climate is dry, surroundings sandy and barren, vegetation scattered low shrubs and trees. The sanitary arrangements were disgraceful. Flies were abundant. About 60 or 70 per cent of the children were affected with trachoma, some to a very pronounced degree, with secondary pannus, etc. Further information gained by the Central Board of Health pointed to the fact that the country towns throughout most of the Midland district were nearly all affected to a similar degree with trachoma.

T A S M A N I A.

Tasmania is an Island State south of Australia proper, from which it is separated by Bass Strait.

The total area is 26,215 square miles, and the population is 183,387.

The climate is cold compared with the mainland of Australia, and moister. On the west coast it is nearly always raining; but, throughout the Island generally, there is much more clear, bright, sunshiny weather than is the case in Great Britain.

Trachoma is so rare that as an indigenous disease it is practically non=existent.

Dr. Hogg, ophthalmic surgeon in Launceston, on the north side of the Island, writes:—

"Trachoma is extremely rare in northern Tasmania. In the inspection of several thousand school children in Launceston, I have only seen one very doubtful case. Nearly every case of tra=choma seen by me here has had a history of having lived in another colony, and having acquired the disease there. Trachoma acquired in Tasmania must be very rare, and I can find no absolute positive proof of such a case."

Dr. Walpole, an experienced surgeon, who was at one time House Surgeon under Swanzy, and is

thoroughly familiar with trachoma, having practised for ten years in Western Australia, South Australia, Queensland, and New South Wales, writes, that, at Gormanston, a large mining district, where he has practised for the last seven years, he has had only one case of trachoma, and that was contracted in Victoria.

Dr. Gertrude Halley, Medical Inspector for the Board of Health, Hobart, writes:— "Out of 16,000 children examined in Tasmania, I only saw one case of acute trachoma in Launceston, and one case of old scarring down in Queenstown (the child had come over from Western Australia). In all cases where vision was sufficiently low to interfere with educational progress (V = 6/12 or less), in cities 12 per cent, and in the country 8 per cent, I carefully examined the cornea with a lens, and only in two cases saw, as above, evidence of trachoma."

All the practitioners from other parts of Tasmania, from whom I have had replies to my enquiry, state that they never see trachoma, except an occasional imported case.

N E W Z E A L A N D.

New Zealand has an area of 104,751 square miles, and a population, in 1906, of 888,578 whites, and 47,731 Maoris.

The climate, on the whole, resembles that of Great Britain. It is somewhat sunnier, and less moist in the North Island, but cold and more rainy in the South Island.

Trachoma amongst the colonists is extremely rare. Of thirty medical men who replied to my enquiry, 17 write that they have never seen a case. Others have seen an occasional case, pro= bably imported.

Dr. Wallace Mackenzie, Ophthalmic Surgeon in Wellington, the capital of New Zealand, "has not seen half a dozen cases in white people in 25 years. We have never had trachoma here. The cases come from abroad, and soon recover from the inflammatory (? signs)."

Dr. Lindo Ferguson, Ophthalmic Surgeon, of Dunedin, the chief town in the South Island, and a seaport, asked his assistant, Dr. Bathgate, to go through the records of his hospital cases, and found only two cases in the last three years. Dr. Bathgate, since being assistant to Dr. Ferguson, (from December, 1905) can remember seeing only two cases, one a Syrian woman, and the other a boy, typically low Irish.

Dr. Savage of Auckland, the largest town in the North Island, says, "There is no true trachoma in New Zealand. Maoris have severe follicular conjunctivitis."

TRACHOMA IN MAORIS.

While there is unanimity of statement that trachoma does not occur amongst whites, in answer to my specific question as to whether Maoris were affected by it, whilst most of the responses were, "Not in this district," in a few instances the answers have been different.

Dr. Savage, as above, says Maoris have severe follicular conjunctivitis.

Dr. Robertin of Auckland says, "Have seen cases of so called trachoma amongst Maoris, but, to my mind, not the same."

Dr. Mackenzie of Wellington says, "I believe the so called trachoma amongst Maoris is closely allied to Egyptian trachoma. It is not so severe, and the onset is frequently an acute attack of purulent ophthalmia. The gonococcus is frequently present. It does not seem to spread by direct infection."

Dr. Reece of Hamilton, and Dr. Laprack of Thames both say trachoma occurs amongst the Maoris.

Dr. Wilson of Bull's says, "Trachoma is uncommon in New Zealand, but I believe it occurs amongst the Maoris at Rotorua." And Dr. Wohlman, Government Medical Officer at Rotorua, writes "I have not seen trachoma among the white population, but 50 per cent, or more, of the local Maoris have injected conjunctivae, and there is every gradation between follicular conjunctivitis, and trachoma of a mild form."

Dr. Pabst, now Chief Health Officer at Hobart, Tasmania, writes, "During the 2½ years I was Health Officer at Auckland, New Zealand, although the

disease was not notifiable, I heard of four genuine cases of trachoma, two of which were in recent arrivals from Australia. There also is alleged to be cases of trachoma among the Maoris, more especially in the northern parts of the Auckland district. No actual cases, however, came under my notice. Some of the Maoris, who went to perform in New York, were not allowed to land for some time, owing to the quarantine officials stating that they found cases of trachoma amongst them on their arrival."

If the form of conjunctivitis from which the Maoris in certain districts suffer be trachoma, and if trachoma be contagious, it is strange that it does not occur at all amongst the whites, as the whites and Maoris mix together freely, and intermarry, and both white children and Maoris attend the same schools.

SOUTH PACIFIC ISLANDS.

Last year I travelled through the Tongan, Samoan, and Fijian groups of Islands, and, so far as my observations went, there was no trachoma there.

Dr. Maguire, for many years Government Medical Officer at Nukualofa, the capital of the Tongan Islands, tells me he has not seen a single case of trachoma in either natives or whites, during the many years he has been there, though catarrhal ophthalmia, readily yielding to treatment, is not uncommon.

Dr. Pym, of Vavau, says the same.

In Samoa I saw no trachoma, and the doctors there tell me they never see it; and Dr. Fox, for many years practising in Suva, the capital of Fiji, says he doubts if he has ever seen a case of true trachoma, though a form of catarrhal conjunctivitis, known by the native name of "THEKA" is common both amongst whites and natives, and the Indian coolies, of whom there are many thousands employed in the plantations.

In all these Island groups one sees many cases of eye disease, chiefly corneal troubles, but these are not due, in any case, to trachoma, but are

chiefly traumatic, and less frequently gonorrhoeal

In New Caledonia, a French Convict Colony, there is no trachoma amongst the natives, and only an occasional case amongst the recently imported French convicts.

All these Islands are within the tropics, and the moisture laden trade winds blow throughout the year, and the heat, though oppressive, is chiefly so because of the high degree of humidity.

E T I O L O G Y.

A causal micro=organism has not yet been demonstrated, and though there is a preponderance of opinion that the disease is contagious, even that has not been satisfactorily proved.

The difficulties in the way are great, and many of the statements, and arguments set forth as evidence of contagiousness, appear to be not sufficiently founded. The spread of the disease in certain localities can be explained in other ways than as being due to a specific microbe, and some of the so called "known facts" seem to be contradictory.

For example, Boldt (p. 109) states that although we are "quite ignorant of the virus, yet we know with certainty that it is contained in the discharge. ..... It appears to have extremely low vitality, and little resistance, so that it is only conveyed directly, e.g.by con= tact, and never by means of intermediate persons or things." On page 109 he says, "It is generally believed, but not yet proved that the disease is transmitted solely by means of the discharge" Again, he says, (p.122) "The temperature of the atmosphere seems to have little effect upon it,

whilst the humidity has an important influence. The discharge remains virulent for a considerable time in moist surroundings, such as in wet linen or in damp air, but it very quickly ceases to be contagious in a dry material, and drying the discharge at once renders it inactive. The comparative dependence of the virus on the moisture of the air readily explains the existence of trachomatous areas in low lying parts, by coasts, rivers and marshes."

Here, in Australia, humidity appears to have an influence, but in the opposite way. The humid districts are free, while the hot, dry areas are those in which the disease is most rife. Observe also the contradiction to the statement that the virus is "never conveyed indirectly by persons or things." On page 108, he (Boldt) says, "The transmission may be due directly to spurting of the discharge into the eye during examination, or at operation, or indirectly to fingers soiled with the discharge, or the common use of toilet articles, e.g. towels handkerchiefs, washing basins, also articles of clothing and bed linen, as well as by several people sleeping in one bed. It is not improbable that the infection may be transmitted by door latches, and stair rails, which have become contaminated."

Again, Schweigger maintained, and many writers assert, "The cause of trachoma must be sought chiefly in bad sanitary conditions. Badly ventilated, over crowded rooms in houses, barracks, schools, factories, etc. may not only produce trachoma in a previously healthy conjunctiva, but give a trachomatous character to any chronic conjunctivitis."

Here, in Australia, the disease is found practically only amongst those leading healthy, out=door occupations, certainly anything but over

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crowded, living in houses whose doors and windows are open day and night. The chief sufferers are generally persons otherwise in robust health, vigorous, well=nourished farmers and their families. The only exception to this statement is that it is in children of lymphatic or strumous type that we find the worst and most intractable cases.

Of course it goes without saying that the infective agent (if any) is contained in the dis= charge, but how many cases of true trachoma, do we see that run a chronic course without any severe exacerbations, and without, at any time, any dis= charge beyond increased lachrymation, or, at most, at times, a very slight mucoid addition?

To enter into an analysis of the statements of the authorities for and against the contagious= ness of trachoma would take volumes, and would be foreign to the scope of this paper. The more one reads, the more does one see that the evidence for contagiousness is at least inconclusive, and, though, as said before, most authorities assert that it is contagious, there are others of weight, such as Forster, Muttermilch, Cuenod, Gunning, and others, who deny its contagiousness entirely, and we have also the significant fact that no convincing evidence exists of true trachoma having been con= veyed to man by experimental inoculation, though often tried.

As regards trachoma in Australasia, there can be no question, from the evidence collected, that climatic conditions have the most potent influence in the development and spread of the disease, and the condition, of all others, is dryness, combined with heat and dust. Moist heat has little or no influence except a retarding or curative one, as witness the absence of trachoma in the moist

tropical parts of Queensland, Papua, the Pacific Islands, etc., and in the comparatively moist atmosphere of the coastal districts throughout Australia; also the fact that cases benefit by being sent to the coast from the dry inland dis=tricts. Moreover, it is in the hot, dry sum=mer months that exacerbations of the complaint occur in the affected areas.

In Egypt, Morax and Lakah,(quoted by Treacher Collins) from a study of the disease in Alexandria, came to the conclusion that climatic conditions and race exerted no influence. On the other hand, Dr. Alfred Osborne who had had five years' experience at a large poly=clinic in the same town, said that the increase in eye diseases in the hot summer months followed a course approximately like that of all the plagues of Egypt, light, heat, dust, the overflow of the Nile, and flies. Treacher Collins observes "that climatic conditions alone are not sufficient to produce the disease is shown by the immunity enjoyed by the large European population, who observe ordinary cleanly precautions."

The experience in India is similar to the Australian. In his census report for India, for 1901, Mr. Gaut says, "The prevalence of blind=ness is to a great extent determined by climate. It is most frequent in a hot and dry climate, where the glare and dust are highly prejudicial to the sight, and is comparatively rare in a cool or damp climate, where a profusion of green vegetation meets the eyes, and where there is an absence of dust. This variable distribution .... is most likely due to the greater prevalence of conjunctival affections, especially trachoma in these (hot, dry) districts."

Opposed to our experience here is the fact that trachoma flourishes in moist climates e.g. Japan, China, Central Asia, etc., but here the

racial factor comes into play, as it also does elsewhere e.g. amongst the Jews in Central Europe.

To explain the fact that trachoma is rife (in other parts of the world) in moist, marshy country, as well as in hot, dry, dusty districts, it has been claimed that there are two separate kinds of trachoma, one due to dryness of the atmosphere and dust, and the other to marshes.

With regard to Asia, Dr. Gilbert E. Brooke, Port Officer at Singapore, (Philippine Journal of Science for August, 1910) found amongst the 240,000 immigrants for the year 1909, chiefly Chinese Coolies and Malays, only 137 cases of conjunctivitis, though carefully looked for, and of these 137, only 7 or 5.1 per cent were trachoma, or .00291 per cent of trachoma in all the cases examined. 73.7 were catarrhal, chiefly Koch-Weekes bacillary cases. 3 cases were gonorrhoeal, and 25 were undeveloped, but "were not trachoma." This surprisingly small percentage of trachoma is so contrary to general opinion as to its frequency amongst this class of people, as to be worth noting.

Treacher Collins is responsible for the statement that it is probable the disease was first introduced into Australia by the convicts, who were transported at one time in large numbers from England. The improbability of this opinion being correct is shown by the facts that, to the three States where trachoma is most rife (Queensland, South Australia, and Western Australia) no convicts were ever sent; secondly, that, while it exists in the interior of New South Wales, a part undiscovered till after the convict days, yet in the neighbourhood of Botany Bay, and the adjoining coastal districts, the only part where convicts were received— in fact, almost the only part of Australia colonised at that time, and for years

afterwards— there is no trachoma, except in Sydney, where it occurs mostly in imported cases; and, thirdly, that in Tasmania, (the other convict settlement State) there is none.

The influence of climate is also very evident in South Australia, where, as we have seen, there is very little trachoma south of Goyder's Line, and a considerable amount of it to the north.

Those of my correspondents, who believe tra=choma to be contagious, differ in their opinions as to method of infection. Many say it is con=tagious by direct contact only, others consider flies causes of infection, others strongly oppose the theory of fly infection, whilst, with others again, it is an open question.

Dr. Cleland says:— "The flies here" (Western Australia) " are chiefly of two species. One is Musca Domestica, the common house fly, which con=fines itself more especially to dwellings, hovering around food stuffs, etc. This fly, as a rule, does not seem to specially hang around the eyes. The other fly, however, Musca Vetustissima, never comes inside houses, but is extraordinarily fre=quent in the open. It frequently gets into the eyes, apparently to suck at what moisture it can. It is often a desert species, and hence must take any opportunity of taking moisture, which it does in the eyes of man and animals. I take it that if any fly is the dispersing agent of the supposed parasite of trachoma in Australia, it will turn out to be this particular species."

There is a distinct form of eye affection in Australia, known as fly blight or "bung eye" because the eye is"bunged up". This is due to the bite of a small black fly, which is found in small numbers in the districts infected by the Musca Vetustissima. The contagion of Sandy Blight, and possibly of trachoma, is supposed to be conveyed by the latter from eye to eye. The

small black fly referred to bites in the neighbourhood of the lids, which rapdidly swell to such an extent that it is impossible to open them. The bite causes momentary pain, but the subsequent swelling is painless, is not accompanied by discharge, and subsides in a few days, leaving the parts as they were before. There is no suggestion, by those who believe that flies convey contagium in trachoma, that these act as intermediary hosts, as has been put forth in America, on what seems to be very scanty evidence. These flies do not bite. The contagium of "Sandy blight" and possibly of trachoma is supposed to be merely carried on the body of the fly from eye to eye.

An argument against the fly borne theory of infection lies in the fact that the plagues of flies occur at two chief seasons of the year, in the spring (September and October) and again in the late autumn (March and April, and in Queensland into May), whilst trachoma is most in evidence in the summer and early autumn, December to February, inclusive.

The majority think the infection is in the family, as it occurs in many members of the same house, and these think that direct contact, infection by means of towels, etc. are the chief means of communicating the disease.

The fact of its occurring in several members of a household, in districts where the disease is very prevalent, is not evidence of contagiousness. We find post nasal adenoids occurring in several children of a family, but this disease is not considered to be microbic in origin, or spread by infection. Adenoids in this country occur chiefly in the moist coastal districts, and are comparatively rare in the dry interior, so that probably climatic influences have something to do with their production, as with the occurrence of trachoma, though it is just the opposite kind of climate that is concerned in each case.

Some of my contributors note specially that trachoma does not spread in schools, where a few of the pupils are affected (Boldt also remarks that "schools play a comparatively small part in the spread of trachoma," and that "it is not a true school disease").

It is not improbable that the conjunctivitis that spread so generally amongst soldiers in Europe, and was by them communicated to the civil population, was largely a gonorrhoeal ophthalmia. In this connection it is interesting to note that the "chlamydozoa" which Van Prowazck believed to be the causal organisms of trachoma, are found also in non trachomatous gonorrhoeal ophthalmia.

As far as my private observations go, where I have seen several children in a family affected with trachoma they have usually been of a strumous type, and, in many instances, of Irish descent.

There is one remarkable and well known fact, of which I have seen many instances, and which is rather opposed to the idea that trachoma can be contagious, and that is, that cases occur in which one eye is affected with undoubted trachoma— often severely, and with complications, such as pannus, ptosis, etc.— and has been affected for years, and yet the other eye is perfectly healthy. This does not go to show that it is very contagious, unless it be assumed that the disease is microbic, and the other eye has been protected by an antitoxin. An antitoxin would imply a microbe, and a microbe would imply infectiveness, but neither the microbe nor the infection has been proved to exist. Moreover, an antitoxin that would protect the sound eye ought surely to go a long way towards curing or shortening the duration of the disease in the affected eye, and yet we do not find that this happens.

Considering that in all the trachoma districts the catarrhal form of ophthalmia, called "Sandy

blight" is also very prevalent, it is, I think, not unlikely that similiar influences cause the two diseases, and that it is some predisposition in the individual, or families, to trachoma that causes this form of ophthalmia to develope in some, and not in others. It is generally impossible to say at first whether a case will run its course, as simple catarrhal "Sandy blight" or whether trachoma will ensue. In the hot, dry, sandy districts, we have always the two diseases side by side. In other parts we have isolated cases, and even small epidemics of catarrhal conjunctivitis, but no trachoma.

May it not be that the incessant irritation of the conjunctiva by heat, glare, and dust determines a chronicity, which, continued long enough, developes,,in suitable subjects, into trachoma; whereas, in a more favourable climate, the conjunctiva being healthy when catarrhal inflammation attacks it, is more resistant, and throws off the disease, instead of taking on the trachomatous inflammation?

AGE.

With regard to the influence of age, we find trachoma, like "Sandy blight, affects chiefly children from two years of age onwards. I have never seen trachoma in a child under two, nor have I known it to <u>begin</u> in any individual after the age of fifty— and this is the experience of other medical men here.

TRACHOMA IN ABORIGINAL RACES.

It does not appear that the aboriginal Aus= tralians are exempt from the disease. If anything, they seem rather more prone than the whites to suffer from it, in the affected districts.

Dr. Cleland has called my attention to a remark made by that wonderfully keen observer, Dampier, who landed on the north west coast of Australia in 1688. He says, speaking of the aboriginals, "Their eyelids are always half closed to keep the flies out of their eyes, they being so troublesome here that no fanning will prevent them from coming to ones face, and without the assist= ance of both hands to keep them off, they will creep into ones nostril, and mouth too, if the lips are not shut very close, so that from infancy being thus annoyed by these insects, they do not open their eyes as other people; therefore, they cannot see far, unless they hold up their heads, as if they were looking at somewhat over them" Dr. Cleland adds, "It has always struck me that possibly this condition mentioned by Dampier was really due to trachoma."

CHARACTER OF AUSTRALIAN TRACHOMA.

The disease here presents the same clinical picture as does typical trachoma, as I have seen it in Europe, Egypt, Japan, and the East, but, on the whole, it is of a much milder type. This probably is because the people are more alive to the seriousness of the consequences of neglecting the disease, and, being in easier circumstances, are better able to have proper treatment. Relative racial immunity is probably also an important factor.

We get the same complications and sequelae (thickening and drooping of the upper lids, pannus, corneal ulceration, staphyloma, trichiasis, entropion, and, occasionally, xerosis), but severe complications are rare.

If there is one point on which Australian trachoma seems to differ somewhat from the European type, it is that we do not so often see the exuberant "cauliflower" growth in the retro-tarsal fold.

There is a general concensus of opinion, in which I concur, that the disease is milder than it was twenty or twenty-eight years ago. We do not see such a large proportion of severe cases as formerly, nor so many with serious complications or sequelae. This is probably due to the fact

that the sufferers are more educated up to the im= portance of early attention to the condition; that there are now many more competent medical men in the affected districts, than there were a decade or two ago, and that the extension of the railways afford better facilities for getting away from the inland districts to the coast.

TREATMENT OF TRACHOMA.

The method of treatment adopted by myself, and I believe by most surgeons, is on the lines usually followed elsewhere. Change of air, away from the hot inland districts to the highlands, or, preferably, to the sea, is an important remedial measure. If this change can be secured, and appropriate local treatment adopted, mild cases clear up quickly, and moderately severe, and bad cases, generally improve steadily, but on return to the hot, dry, inland districts, they very frequently relapse, in spite of the continuance of local treatment.

Local treatment includes correcting of existing ametropia; protective dark goggles (when necessary, the proper powers being ground into the glass); cleanliness, secured by frequent washing out of the conjunctival sac with mild, non-irritating lotions, boric acid, or normal saline being as good as anything, and better than perchloride of mercury, or any irritating substance; painting of the everted lids daily, or as often as considered necessary, with solution of silver nitrate, or of argyrol, or sulphate of copper stick. In severe cases, with much discharge, there is nothing so good as the time honoured silver solution,

from 10 to 30 grains to the ounce, according to severity of case, and succulence of conjunctiva. In the milder cases, argyrol in 25 per cent solution, answers well, and is applied by rubbing the solution in by means of a swab of cotton wool, twisted round a thin glass rod steeped in the solution. Where there is much thickening of the lid, and pannus, the old Pagenstecher's ointment, or white precipitate ointment is useful, combined with atropine if there is ciliary congestion. Atropine, without the mercurial salt, is used when the congestion is great.

Expression, by means of Grady's forceps, (which I prefer to Knapp's) shortens the period of treatment, in cases where there are large trachoma bodies, and it is repeated when necessary. A local anaesthetic is used for this little operation.

Some years ago, I got great benefit from nascent iodine by means of electrolysis, using a strong solution of iodide of potassium. A metal plate, to which was stitched a piece of lint soaked with the solution, attached to the positive pole, was applied against the palpebral conjunctiva, a sponge, attached to the negative pole against the skin of the lids. A current of two milli= amperes was passed for two or three minutes.

The cases suitable are those in which the sago grain bodies are prominent. The effect of the treatment is to cause these bodies to lose their opalescent appearance, and become white, opaque, and cheesy, and to drop out, or shrink and disap= pear.

One objection to this treatment is that it is painful, in spite of local anaesthesia, and the reaction is excessive.

Chiefly because of the pain and congestion, and also, because at this time crushing by means of Knapp's roller forceps came into vogue, I dropped

this method of treatment, though I still consider it a valuable one.

Excision of the retro=tarsal fold is adopted in suitable cases, but these are not numerous. There is not so much contraction of the fornix afterwards as some surgeons fear, and not as much as would result from long continued topical applications.

Excision of the tarsus is only done in chronic cases with much thickening and ptosis. The ptosis diminshes after the operation, contrary to what one might expect.

It is remarkable how some cases of severe trachoma clear up without any treatment at all. I have seen cases where there has been absolutely no treatment (not even a cleansing lotion, nor even change of air) recover with less traces of the disease than many of those treated according to any of the recognised methods. The remaining ptosis has been slight, there has been little or no deformity of the lids, and the cicatrical lines on conjunctiva have been in the form of a very fine,delicate, silvery tracery, and only very fine lines and faint cloudiness for a short distance in to the cornea from the upper limbus, the only remains of the pannus.

There can be no question that treatment can be, and often is, too energetic. The operation of crushing, if not carefully done, is apt to lead to extensive scarring, and strong topical applications are only needed in exceptional cases. I believe that simple washing out of the sac with warm 1.4 per cent saline solution, with rest and protection of the eyes, and change of residence to a cool climate, if continued for a sufficient length of time, in most cases, brings about a more satisfactory final result than the constant application of strong local agents.

When routine touching of the conjunctiva is carried on, no matter what the agent may be, benefit always follows frequent intermissions of these applications, nothing but the mildest cleansing lotion being used in the intervals.

X Ray treatment in my hands has not been successful, and radium I have not used.

SUMMARY AND CONCLUSIONS.

(1) Trachoma occurs in Australasia generally to a very slight extent, but is very prevalent in the hot, dry, dusty, inland districts, notably in the western districts of New South Wales, and Queensland, the northern parts of South Australia proper, and to a lesser extent in the inland country in Western Australia. In the coastal and contiguous country, the highlands, and the moist, tropical portions of the Continent of Australia, it is practically unknown, except for imported cases. In Tasmania, it is practically non-existent, and also amongst the white population of New Zealand, though a doubtful form of disease resembling trachoma in a mild form occurs amongst the Maoris in certain parts of the North Island.

(2) The disease presents essentially the same clinical picture as it exists in Europe. The chief point of difference consists in the rarity of the exuberant hypertrophy of the upper retro-tarsal fold. The complications and sequelae are similar to those of trachoma elsewhere; pannus and ulceration of the cornea,

staphyloma, trichiasis, and entropion being the chief. Xerosis is rare; but these complications are relatively infrequent, and, on the whole, the cases are of a mild type compared with those one sees, for instance, in Egypt, parts of India, Japan, etc.

(3) The question of contagiousness is not definitely settled. If contagious, it is only slightly so, and other factors have an important influence on its spread. The contagium, if any, seems to exist in the family, and personal or family vulnerability is suggested. It does not spread in schools. Whether flies are intermediaries or not is uncertain. (By intermediaries is meant direct carriers, not that they are intermediate hosts).

(4) In Australia the influence of climate is the most constant element in the development and spread of the disease, heat, with dryness of the atmosphere, glare, and dust being the most important factors.

(5) In the affected areas, side by side with trachoma, there generally exists a form of contagious catarrhal ophthalmia called "Sandy Blight," in which the Koch Weekes bacillus can often be demonstrated. Heat, glare, dryness, and dust, by their continued irritation, induce a condition of the conjunctiva favourable to the development of either disease. The same conditions, if sufficiently long continued, are followed by trachoma, in certain cases. It is possible that the same micro-organisms even may be concerned in the production of trachoma in these cases.

(6) Overcrowding, poverty, semi-starvation, vitiated atmosphere, (except in so far as dust is an impurity) are not here concerned in the spread of the disease, as is said to be the case in other places.

Most of the patients are strong, well nourished, and (except for the trachoma) healthy persons, living in easy circumstances as compared with the class of sufferers in other countries, and leading a healthy, out of door life.

(7) Where it occurs, it is mostly children and young people who are affected, and it is often found in several members of a family.

(8) In the affected parts of Australia, the aborigines are susceptible to trachoma.

A P P E N D I X.

I have only to=day accidentally discovered that Dr. Gordon MacLeod has been also preparing a paper for a thesis on the incidence of eye diseases in Australia, and has been conducting some investigation into the distribution of tra=choma in the State of New South Wales.

At the meeting of the Ophthalmological Society last week he read a paper on this subject, and showed tables and map.

My paper was finished and ready to go to the binders, but I kept it back till I could get a copy of Dr. MacLeod's table, which he only furnished me with this morning, and then we each accidentally discovered that the other had been working on this subject in connection with a thesis.

Although working on different lines, and quite in ignorance of what the other was doing, we haveeach found, broadly, the same distribution of trachoma as regards this State.

In Dr. MacLeod's table and map, which he showed, a comparatively small percentage of the Moorcliff Hospital cases are given as coming from the coastal and mountain districts.

This then would indicate that trachoma is in these districts more common than I have concluded,

but, as I have elsewhere pointed out, our popula=tion is a very unsettled one, and probably many of the cases, whose last place of residence was in one or other of these districts, contracted the disease elsewhere.

For example, many of our trachoma cases are shearers residing in the coastal or highland districts, small farmers, who add to their earn=ings by shearing sheep on the larger sheep stations in the west. They travel in these districts from station to station for many months in the year, and then return to their homes nearer the coast, often bringing trachoma with them. As in all new countries, many familes settle in one district, and then after a short residence there, move on to another.

The doctors in these coastal and mountain areas, with remarkable unanimity, have stated that non=imported trachoma is practically non=existent in these districts.

227 Macquarie St.,
Sydney.
1st February, 1911.

T A B L E

Showing the relative proportion of trachoma cases admitted to Moorcliff from the various State Divisions (Metropolitan Area excluded). Estimated on basis of five consecutive years.

State Divisions.	Percentage.	Average Rainfall.
North Coast	.709	56.78
South Coast	2.86	38.87
Hunter & Manning	3.22	40.11
Southern Tableland	4.12	27.22
Riverina	5.55	16.27
Northern Tableland	6.63	34.06
Central Tableland	8.24	30.93
Central Western Slope	8.24	25.21
North Western Plains	10.03	20.42
North Western Slope	10.21	27.79
South Western Slope	10.57	24.67
Central Western Plains	10.75	18.75
Western Division	18.81	13.02

The apparent exception of Riverina to the rule, that where rainfall is small trachoma is prevalent, is explained by the fact that Riverina is on the borders of the neighbouring State of Victoria, and closer to Melbourne than to Sydney, so that many, probably most, of the trachoma cases go to Melbourne.

QUEENSLAND

SOUTH AUSTRALIA

VICTORIA

Goondiwindi

Pt Danger

Mungindi

Lismore

Moree

Collarenebri

Ashford

Glen Innes

Grafton

Bourke

Walgett

Narrabri

Armidale

White Cliffs

RIVER

Tamworth

Kempsey

Wilcannia

Cobar

Nyngan

Coonabarabran

Port Macquarie

WESTERN DIVISION

Broken Hill

Murrurundi

Merriwa

Wingham

Taree

Narromine

Denman

Newcastle

DARLING

Forbes

Bathurst

Hillston

Cowra

Katoomba

METROPOLITAN

Sydney

Wyalong

Wentworth

Temora

Moss Vale

Hay

Balranald

Narrandera

Cootamundra

Goulburn

RIVERINA

Wagga

Tumut

Braidwood

Deniliquin

MURRAY

Moama

RIVER

Albury

Kiandra

Cooma

Bombala

Eden

Cape Howe

Mt Kosciusko

CENTRAL WESTERN PLAIN

NORTH WESTERN PLAIN

NORTH WESTERN SLOPE

NORTHERN TABLELAND

NORTH COAST

CENTRAL WESTERN SLOPE

CENTRAL TABLELAND

HUNTER & MANNING

SOUTH WESTERN SLOPE

SOUTHERN TABLELAND

SOUTH COAST

MAP OF NEW SOUTH WALES

showing relative proportion of Trachoma cases admitted to Moorcliff Eye Hospital during a period of five consecutive years.

(Metropolitan District excluded)

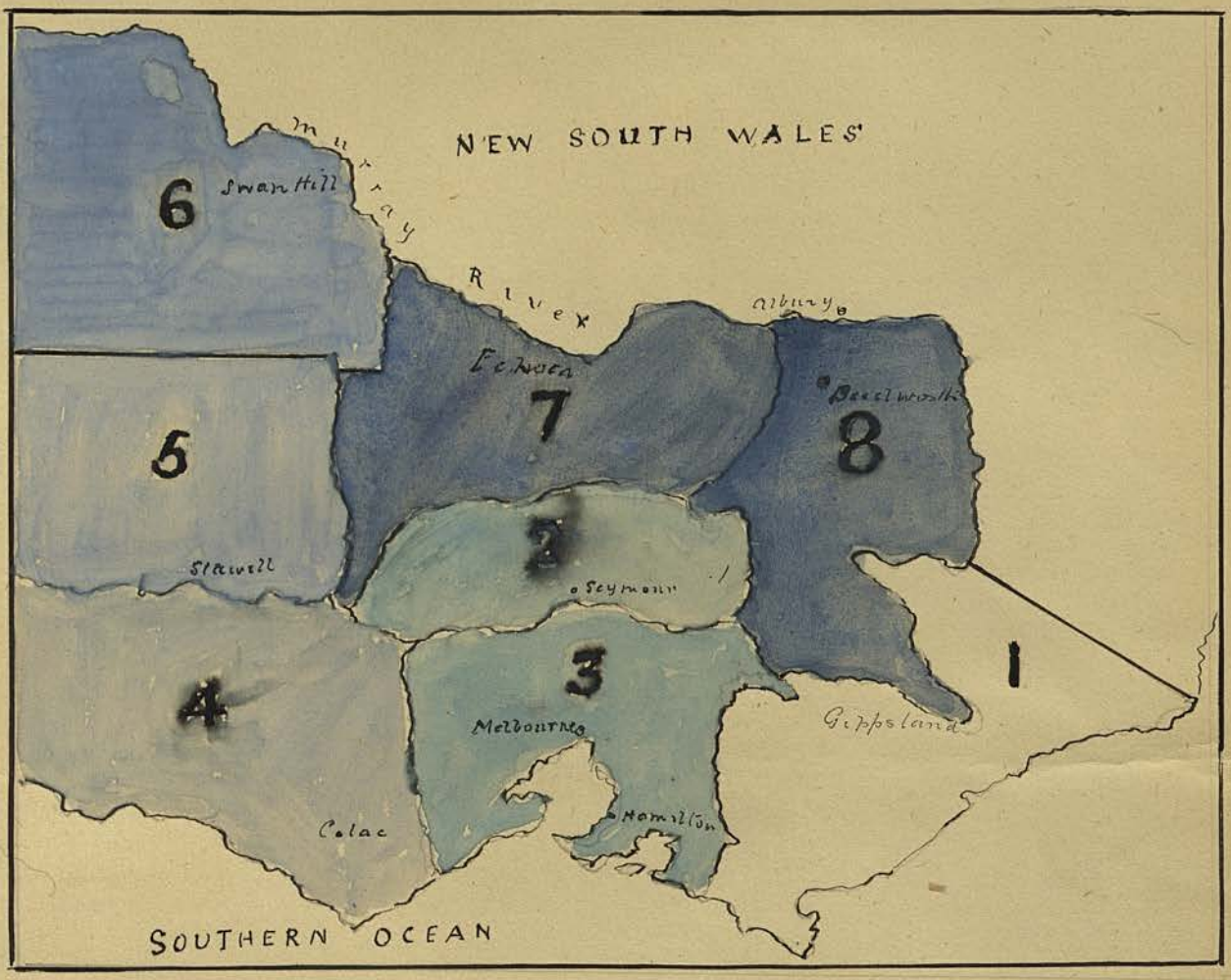
SCALE OF MILES

0 50 100 150

This crudely coloured photograph is sent to give an idea of a western dust storm. The photo= grapher, who has copyrighted it, refuses to print uncoloured pictures, or to allow the picture to be reproduced.

After such a storm the air is so charged with dust that the sun can be looked at by the unpro= tected eye for the whole of the following day.

A Phenomenal Dust Storm at Nampa



From Paper by Dr. Barrett & Orr. of Melbourne

To indicate comparative distribution of Trachoma

in Victoria

1 Gippsland District
2 North Central District
3 Central District
4 Western District
5 Wimmera District
6 Mallee District
7 Northern District
8 North Eastern District

RAINFALL OF AUSTRALIA.

The above map has been prepared from a chart shewing the isohyets (curves of equal mean annual rainfall) for every 10 inches for Australia, and compiled from the most recent information. It was impracticable on the small scale map to distinguish between the areas with 40 to 50, 50 to 60, 60 to 70, and over 70 inches of rain annually.

BANDA SEA
FLORES SEA
JAVA
TIMOR
TIMOR SEA
ARAFURA SEA
TORRES STRAIT
GULF OF CARPENTARIA
CORAL SEA
GUINEA
SOLOMON ISLANDS
FIJI GROUP
SANTA CRUZ Is
NEW HEBRIDES
NEW CALEDONIA
SAMOA OR NAVIGATOR Is
WESTERN AUSTRALIA
NORTHERN TERRITORY
SOUTH AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
VICTORIA
AUSTRALIA
GREAT AUSTRALIAN BIGHT
BASS STRAIT
TASMANIA
TASMAN SEA
NEW ZEALAND
NORTH I.
SOUTH I.
SOUTHERN OCEAN
PERTH
ADELAIDE
MELBOURNE
SYDNEY
BRISBANE
HOBART
AUCKLAND
WELLINGTON
DUNEDIN
Tropic of Capricorn
E. Long.
Goyder's Line in S.A Aus —
Trachoma Districts
Mountain Ranges